"BURNELL R. FORD—
SCIENTIST ELECTRICAL WIZARD"

THUS do our friends, the theatrical managers, announce the electrical star of theaterdom—he of the flashing sparks and mastodonic Tesla coils. Mr. Ford is one of the most successful scientific lecturers in the country and is now on a Chautauqua tour.

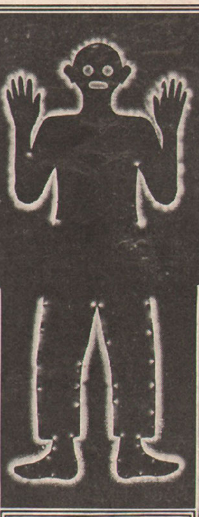
"The late Elbert Hubbard described electricity as 'the juice.' Since Benjamin Franklin brought it from the sky with a kite, no better, or more scientific definition has been made. Yet the remarkable misunderstanding of the nature and properties of electricity seems to be general and permanent. In the entire realm of popular education no one thing can be of more importance than to educate the people on what, to them, are the mysteries of electricity. To do this in a scientific, yet plain and thoroly entertaining way, is no small accomplishment. The management, after much search and many discouragements, has found, in the person of Burnell R. Ford, such a man,"—so reads our program.

One of the startling experiments performed by the lecturer is that of welding by current, which is made to pass thru the human body. Stiff iron wires are solidly welded as shown above, the heavy current flowing from the lecturer's mouth to that of his assistant. The essential thing to be watched in making this experiment is to have metal contact with the mouth (by using a spoon for example) and also to employ a sufficiently high-frequency Tesla current. Such a current, oscillating at say 100,000 cycles per second, will exert no muscular effects and simply passes over the skin of the lecturer.

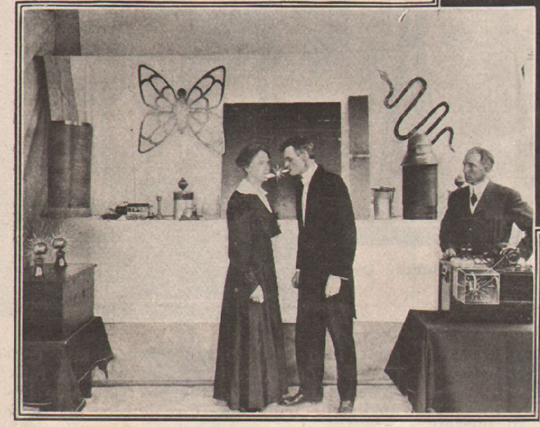
The interesting effect shown in the center top photograph, is attained by cutting out a cardboard figure and covering it with tinfoil. This may be laid on a photographic plate and charged for a second with a high-frequency electrode. If desired a larger figure may be cut out of thin wood and coated with tinfoil. When this is exhibited against a dead-black background and properly excited by connection to a powerful Oudin or Tesla high-frequency coil the effect on the audience is truly remarkable. The foil-covered figure should be charged, preferably from the live terminal of an Oudin coil.

The right top view shows a mystify-

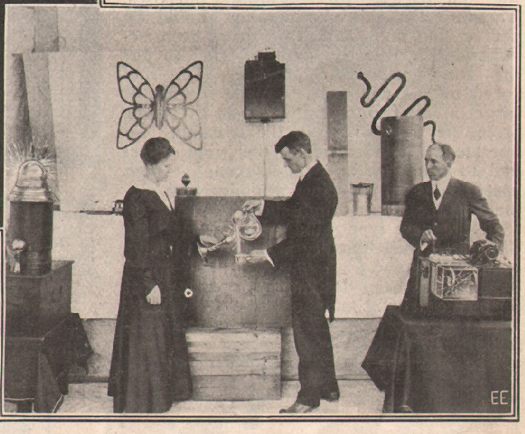
(*Continued on page* 422)



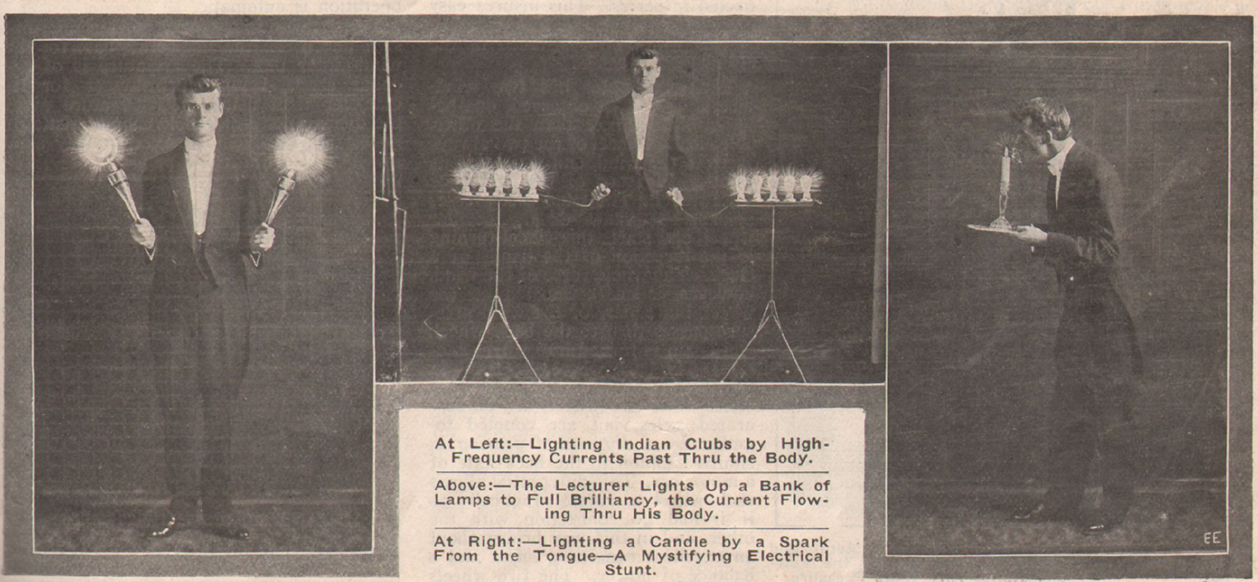
The Electric "Boogieman" Is Made By Cutting Out a Cardboard Figure of the Desired Shape. When Coated With Tinfoil and Charged by One Terminal of An Oudin Coil This Is What You See.



Here Is Shown a Remarkable Demonstration of Electrical Welding Thru Two Human Bodies. Stiff Iron Wires Are Forever Welded, the Current Flowing From the Lecturer to An Assistant. Capable of the Simplest Explanation, This Experiment Is Nevertheless An Awe-Inspiring One.



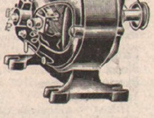
The Photograph Shows the Lighting of An Ordinary Candle by Means of a Stream of Water. In Connection With This Experiment, the Lecturer Becomes a Human Dynamo, Lighting Arc Lights by Holding the Carbons In His Hands and Handling 3,000,000 Volts of Electricity.



At Left:—Lighting Indian Clubs by High-Frequency Currents Past Thru the Body.

Above:—The Lecturer Lights Up a Bank of Lamps to Full Brilliancy, the Current Flowing Thru His Body.

At Right:—Lighting a Candle by a Spark From the Tongue—A Mystifying Electrical Stunt.



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WOULD YOU BE ONE OF THOSE

doomed to go through life alone, without the joys that go hand in hand with a loving wife and healthy children? Our first duty is to posterity. We are not put here by an all-wise Providence merely to live out our lives, and then go out like a snuffed candle. We are entrusted with the sacred duty of perpetuating the race.

LIKE BEGETS LIKE: A man who is torn and racked by physical ailments and excesses of all kinds will some day see these traits in his children. On the other hand the strong, virile man, who jealously safeguards his body and his health, will some day revel in the sight of offspring that are a picture of joyous, bubbling health.

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I have prepared a little book, **"Intelligence in Physical and Health Culture,"** which should be read by everyone sufficiently interested in themselves to wish for the best in life. It points the way to better health, a cleaner, happier life, and a splendid physique. Three 2-cent stamps will pay for mailing the book. Send for it **NOW.**

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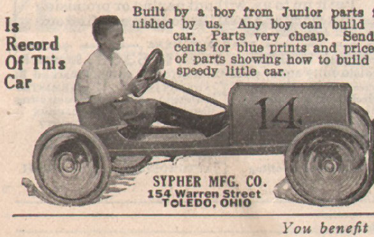

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RADIO TO HURL MINES AT U-BOATS.

After working for many months to perfect a new type of mine, electrically controlled by means of a powerful wireless apparatus located at a distance from the mine itself, a device which would enable one submarine to destroy another, it was learned recently that Dr. J. B. Whitehead, of the Johns Hopkins University, had brought his labors to a successful termination.

While Doctor Whitehead refuses to comment on this new invention, it is learned that by means of a powerful electric battery the new style of mine can be directed upon whatever course its operator may desire and can be exploded by simply pressing a button, the wireless waves being employed both in directing it and in its explosion.

The advantage that such a mine will have over the ordinary torpedo used by the submarine is the impossibility of failure to either miss the target or its non-explosion after the target is struck. By this method Doctor Whitehead has solved the problem of destroying submarines by submarines. In connection with this is a report that an instrument has been perfected to locate positions and distances of the submarine to be attacked.

FREE ELECTRICITY FROM THE WIND.

(Continued from page 372)

The invention of this new slow speed design at once eliminates the gear troubles which all others who have attempted to utilize wind-power to drive dynamos have had to employ. It also makes it possible to effect, by magnetic leakage in the machine itself, its own regulation, and eliminating the use of auxiliary apparatus.

A boy sixteen years old can turn a crank fitted on to the wind-motor axle, when the machine is on the ground, and generate sufficient current to magnetize the dynamo fields and to light to full brilliancy three 16-candle-power lights for a period of twenty minutes at a time.

The axles, differential gearing and bearings are contained in a hollow steel housing, the same as a motor car rear axle, and this housing is pumped full of gear grease. Several machines are on record that have not been re-greased for two years at a time.

The drawing shows that the automatic cut-out and cut-in for the battery is a mechanical ball governor, but this cut-out has been substituted by an electro-magnetic cut-out and cut-in. The electro-magnetic cut-out simplified the plant and is located on the switch-board. With an average wind pressure of ten miles per hour for ten hours per day the larger plant has in practise charged a 25 volt battery with 90 A.H. per days, and has maintained a daily discharge for 8 months of 75 A.H. per day.

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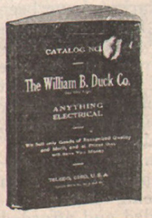

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NEW DISTANCES IN RADIO TELEGRAPHY.

The Marconi station at Bandoeng, East Indies, has succeeded in establishing communication with America, Madrid and Berlin, according to *The Batavia Nieuwsblad.* Presumably this refers only to the reception of messages sent out from those parts of the world. Experiments are being made at Bandoeng with a view to the ultimate establishment of regular wireless communication with the mother country, Holland, and a 300 horsepower motor has enabled the operators to secure the promising result recorded.

"BURNELL R. FORD—SCIENTIST—ELECTRICAL WIZARD."

(Continued from page 371)

ing trick of the electrical conjurer known as "The Human Dynamo." The lecturer's assistant *lights a candle from a stream of water.* The experiment is easily performed by taking the high-frequency current up thru the legs. A piece of wire here and there often helps out the lecturer and prevents him from getting unpleasant shocks. If the current is of sufficiently high frequency no trouble will be experienced in passing it right thru the body. But—don't try letting the current jump to or from the skin or you will rapidly lose your *sang froid.* Arrange matters so that the current jumps to or from a piece of metal in some way. And your conscience need not trouble you, either, for the audience is not being humbugged. The current actually does pass *thru your body,* just the same. It's simply a case of knowing how to handle the current.

The three lower illustrations are of Mr. Ford in a few more of his electrical rôles. At the left he lights fire balls by high-frequency current past thru his body. (The lecturer stands on a metal plate covered with a rug, the plate being connected to a high-frequency coil. A metal insole should be worn, making contact with a spiked nail in the heel of the shoe, which thus ensures a good *large area* contact between the charged plate and the lecturer's body.) The center photo shows the lecturer actually lighting up a bank of lamps thru his body. This experiment always attract undivided attention from any audience, large or small. It really is a remarkable demonstration, involving in many cases the transmission of possibly 500,000 volts and several amperes of current thru the body; and 1/10 of an ampere of low-frequency alternating current past thru the heart is said to invariably prove fatal. In the final photo at the right we see Mr. Ford bidding us good-night, and like all good souls, he lights his candle and prepares to retire. But he lights the candle by a spark shooting forth from his tongue. And just to make it interesting we are going to let our electrically inclined reader find out for himself how this trick is done.

CHEMICAL ACTION OF STORAGE BATTERIES.

(Continued from page 401)

explained with the help of the osmotic theory by Le Blanc. The difficulty in applying this theory to the lead storage battery is to know what are the ions in the case of the lead peroxid plate. According to Le Blanc's theory, the lead peroxid, having a definite, tho slight solubility, dissolves in the dilute sulfuric acid and then reacts with water according to the following equation:—

$$(8) \qquad \underset{\substack{\text{Lead}\\\text{Peroxid}}}{\mathrm{PbO_2}} + \underset{\text{Water}}{2\mathrm{H_2O}} = \underset{\text{Lead}}{\overset{\substack{++\\++}}{\mathrm{Pb}}} + \underset{\substack{\text{Hydroxyl}\\\text{Radical}}}{4\overset{-}{\mathrm{OH}}}$$

New Electro-Therapeutic Apparatus

By H. ROSENTHAL

X-Ray

At the convention of the American Medical Association held at the Hotel Astor in June at New York City, the exhibit of electric apparatus showed many interesting new developments, particularly those to be used in connection with hospitals and field hospitals at the front.

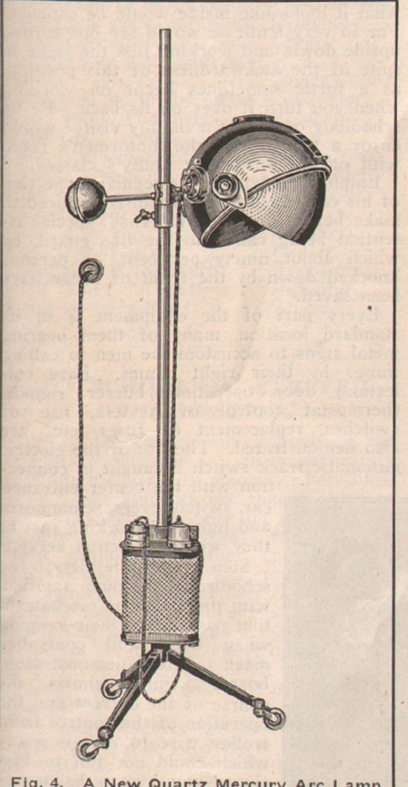


Fig. 4. A New Quartz Mercury Arc Lamp For Treating Skin Diseases.

One very ingenious X-ray equipment consisted of a portable table for laying the patient upon to be X-rayed; the outfit also included a small gasoline engine generating set, a closed core transformer, this transformer being used in connection with a regulating device to operate a new type of X-ray tube. This tube, about four inches in diameter (see illustration, Fig. 1), had an *anode* terminal of solid tungsten metal supported on a rod of molybdenum and a *cathode* consisting of a tungsten spiral, which was heated electrically from a low voltage circuit from the primary of the transformer. The X-ray tube suppresses any current in the direction that does not make the hot filament cathode. It therefore is capable of rectifying its own current. In order to make the conditions stable a large set of air cooled ventilating vanes are made part of the anode of the tube.

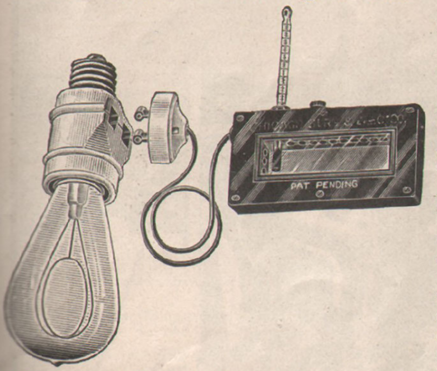


Fig. 7. This Miniature Electric Incubator for Microscope Stages Enables the Physician to Study "Live" Bacteria Organisms.

The gasoline engine unit which operates the transformer is so designed with an electrically controlled solenoid that it can be placed some distance from a base hospital or tent, thus eliminating the unpleasant noise. The entire equipment is so arranged as to be portable for immediate transportation.

X-Ray Accessories

Some of the newer developments in the accessories to be used in connection with X-ray work include the Hydrex tube, Fig. 2. This tube operates on the principle of having an auxiliary chamber filled with hydrogen and sealed from the top by a mechanically operated mercury valve. This valve is opened by drawing the mercury past two porous blocks, thereby leaving a passage for a certain amount of hydrogen to enter the tube. To open the valve a small suction pump is provided and is clamped directly on to the glass bowl, or any other convenient place, so the rubber tube can be attached to the hydrogen chamber. To lower the vacuum the plunger is pulled out to its full length and released immediately. To raise the vacuum all that is necessary is to disconnect the anode and connect it to cathode and run a weak current thru the tube.

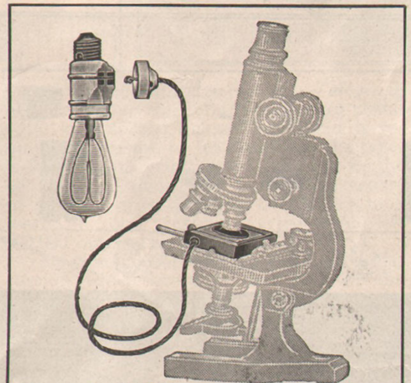


Fig. 6. Small Electrically Heated "Warm Stage" for the Microscope.

Very elaborate tables of new development were shown for laying the patient upon and so equipt as to be used either for examination with a fluoroscope or to be used directly in taking X-ray plates.

One type of table was so nicely counterbalanced that very little effort was needed to obtain almost any position an operator would wish. It was also arranged with a small motor, foot controlled, which would raise the table or lower it in an angular position, according to the will of the operator.

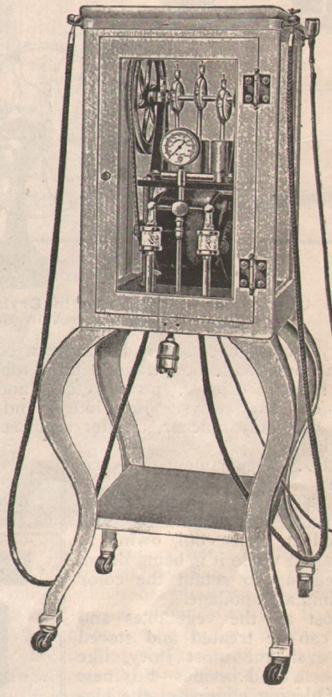
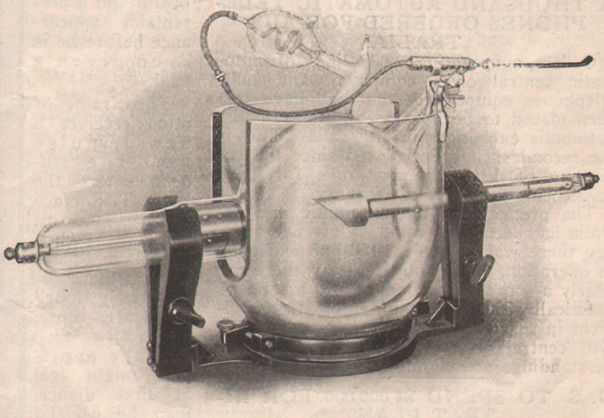


Fig. 5. A Recent Type of Anesthetizing Apparatus, Driven by a Small Electric Motor.

Another type of table was fitted with accessories necessary for making charts of the heart and lungs, these charts or tracings being made directly by examining the patient with a fluoroscope and by means of an automatic device.

A duplicate of the X-ray equipment supplied to the N. Y. Bellevue Hospital was also shown, being the largest X-ray plant in the United States.

(*Continued on page* 421)



Hydrogen Thru a Mercury Valve. Vacuum Is Adjustable.

Hydrogen Thru a Mercury Valve Vacuum Is Adjustable.

NEW ELECTRO-THERAPEUTIC APPARATUS.

(*Continued from page* 373)

Sinusoidal Machines

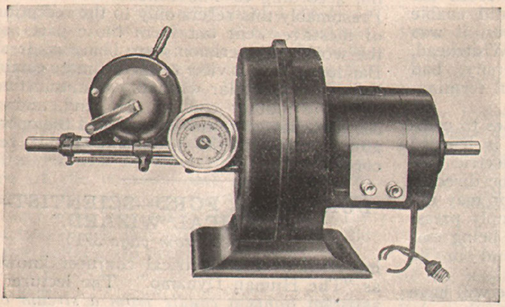
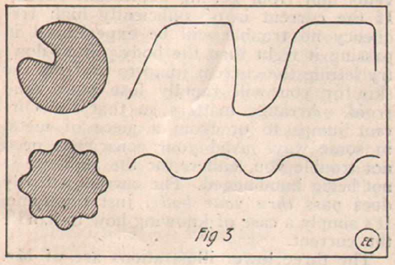
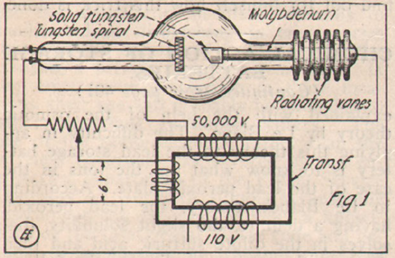


Fig. 3. The Latest Pattern Sinusoidal Generator Which Yields Currents of Any Desired Wave Form. Special Cams as Shown Below, Control This Factor and Can be Interchanged Instantly.



One of the most radical new developments in electrical therapeutics was shown in the form of a Morse Sinusoidal Wave Generator. The machine delivers a current of 21,000 alternations or 42,000 impulses per minute and is designed on what is known as the Kennelly design, the principle being a circular layer of spools composed of two separate coils, an inner one with eight layers of fine wire, and an outer one of two layers of coarse wire, the inner coil being connected in a series and constituting a *secondary* coil, while the outer coil, also connected in a series, forms the *primary* coil of the apparatus. A direct current is supplied to the primary coil and to the armature, which is composed of laminated iron. When the armature is made to revolve the primary coils, having a current circulating thru them, magnetizes the field magnets. The magnetic lines of force thus produced remain stationary in the field as long as the armature is stationary, but as soon as the armature rotates the lines of force shift from one side of the magnetic field to the other and cut the current in the wires of the secondary coil, first one side and then the other, which produces a Sinusoidal current in the secondary coil.



New Form of X-Ray Tube Which Rectifies Its Own Current, on the Principle of the Hot Cathode. Air Cooling Vanes Are Placed on the Anode.

In the apparatus shown, Fig. 3, the primary coil and secondary coil are conical in shape, one moving within the other, this being done by a set of cams, the shape of the cam regulating the type of wave which will be sent into the patient's circuit, and a separate rheostat controls the strength of this current.

Light Therapy

For the treatment of skin diseases a quartz mercury arc lamp was shown which gave off very powerful radiations, the radiations being so intense that the darkest kind of tinted glasses were loaned to the observer before he was allowed to look at the light. From a lamp of this kind a typical case of *sunburn* could be produced in a few minutes time. (See Fig. 4.)

Miscellaneous

A valuable Anesthetizing Outfit was shown (see Fig. 5), operated by a small electric motor of special design for use in operations of the month and head.

An interesting Recording Instrument was shown for obtaining the temperature within the stomach known as *introgastric temperature,* valuable in checking up the gastric response to stimulus, showing the action of different foods, both hot and cold, practically in degrees upon the scale of the instrument.

For the man with a microscope there were several new devices, such as a special light for illuminating the stage of a microscope, and one exhibit showed an electrically heated warm stage for the microscope for use in examining different bacteria and micro-organisms which only remain alive in warm temperatures (blood heat).

An Electric Incubator for use in connection with a microscope was exhibited, which can also be used in connection with the development of special animal organisms and bacteria so that they can be cultivated directly under the microscope.

THE EFFECT OF ULTRA-VIOLET RAYS ON MILK AND OTHER ASPECTS.

(*Continued from page* 383)

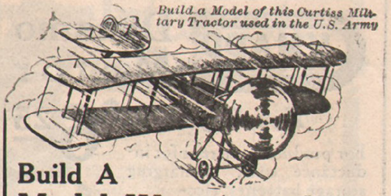
it for the protection of their soldiers and horses campaigning at this time in the colonies of Toncken, Asia, and as it had protected the head against the violent action of the ultra violet rays it was quite successful.

At this time England also tried this protection against the ultra violet rays and as an experiment, an under officer of the English army was completely clothed in garments which had been previously treated to withstand the ultra violet rays. It was found that he was able to stay in the sun of midsummer for hours, without feeling any disturbance or inconvenience in any way. Upon this and other experiments the English Government adopted this method for the protection of their Indian troops against the ravages of tropical sunlight.

INCREASE WIRELESS GUARD AT SAYVILLE.

Fifteen United States Marines have been added to the detail which has been guarding the wireless station at Sayville. There are now sixty-five men from the Marine Corps at the station and it is said that about twenty-five more will arrive shortly to augment the force. Ensign W. R. Smith, U. S. N. R., is in command.

The entire acreage belonging to the Atlantic Communication Company, which is in charge of the plant, is being cleaned up. Much of its area was wooded and afforded cover.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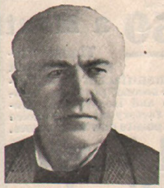

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